



The Odyssey of Ocean Research Drilling: Past and Future Directions

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In his article titled “The Past and Future of Ocean Drilling”, which was published as an introduction to a special volume celebrating the tenth anniversary of scientific ocean drilling, Roger Revelle (1981) summarized the principal results achieved by the Deep Sea Drilling Project (DSDP) from 1968-1978. Specifically, the original goal of the DSDP was to test the newly evolving plate tectonic/seafloor spreading hypothesis. Through ocean drilling campaigns using the facilities of the Glomar Challenger, sediment and rock samples were recovered from beneath the seafloor to provide the direct proof of the hypothesis, and, in fact, the primary goal was amazingly achieved within the first 10 years of ocean drilling.

This major accomplishment was enhanced by additional discoveries, many of which have continued to impact Earth science research during the following 40 years with scientific ocean drilling programs (DSDP, ODP and both IODP’s). Three examples of these discoveries will be highlighted in this presentation with the intention to illustrate how the scientific drilling of the deep sub-seafloor has evolved and continues to impact our knowledge of the Earth System. They are: (1) the discovery of the most recent and largely undeformed salt giant deposited in the Mediterranean basins between 5.96 to 5.33 Ma, (2) the discovery of the enigmatic carbonate mineral dolomite precipitating in deep-sea sediments from near normal seawater but mediated by the microbial activity of the deep sub-seafloor biosphere, and (3) the recognition of the presence, via methane sampling, and ultimately the recovery of intact gas hydrates from deep-sea sediments. Each of these three discoveries continues to drive scientific research in new directions, respectively, i.e. with (1) further fundamental exploration in the case of the Mediterranean massive salt deposits, (2) systematic probing of the nature and extent of the “deep biosphere” and associated in situ diagenesis, and (3) mapping and evaluation of the extent of the environmental hazard versus exploitation potential of the methane locked up in gas hydrates, an energy resource frozen solidly into deep-sea sediments.

In summary, it is often said that, due to the watery veil covering approximately 71% of the Earth, the ocean floor has been mapped in far less detail than the surface of Mars, the Moon or Venus. As of this writing, the ocean drilling programs have drilled and cored slightly more than 1500 deep holes into the ocean floor, a meager number compared to the drilling that has been undertaken on the continents. Although major advances in our knowledge of what lies deeply buried below the seafloor have been made during the first 50 years of ocean research drilling, many of the already recognized phenomena need to be explored and studied in greater detail. Indeed, it is even highly likely that there are more phenomenon just waiting to be discovered with future international ocean drilling campaigns.

Revelle, R., 1981, The Past and Future of Ocean Drilling, SEPM Spec. Publ. No. 32, p. 1-4.